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Introductory Chapter: Bats Eaten by Owls

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1. Introduction

Bats and owls are very popular hobby and research subjects of nature loving people as shown by BatLife and Owler groups all around the world but what is the relation of bats and owls in the wild. An assessment of owl dietary studies and anecdotal accounts was made but the huge material (well over 10 million prey animals) is in print elsewhere [1]. However, the role played by owls in the mortality of Eurasian bats is shortly reviewed for this book.

2. Bat-eating owls

The owl diet studies revealed that most owls are sometimes eating the bats although none makes a living out of them as other prey are much easier to capture. Well-studied European owl species ate a total of 19,864 bats [1]. At least 49 bat species have been identified in the diet samples (**Table 1**).

Barn Owl *Tyto alba* and Tawny Owl *Strix aluco* have captured most of all bats (47.1 and 42.6%), and Long-eared Owl *Asio otus* comes next (7.3%). Short-eared Owl *Asio flammeus* and Eagle Owl *Bubo bubo* take similar amounts of bats (1.2 and 1.3% respectively). For Tengmalm's *Aegolius funereus*, Ural *Strix uralensis* and Little Owls *Athene noctua* bats were fairly rare prey item, with less than 0.1–0.4% of this material [1]. Scops Owl *Otus scops* and Pygmy Owl *Glaucidium passerinum* ate less than 10 bats, so they are not included in **Table 1**.

Bat species	Weight of the bat species in g	No of owl species as predators	Percentage of the Total
<i>Pipistrellus pygmaeus</i>	5.1	1/8	0.26
<i>P.pygmaeus</i> or <i>P.pipistrellus</i>	5.3	1/8	0.19
<i>Pipistrellus pipistrellus</i>	5.5	6/8	16.02
<i>Myotis mystacinus</i>	6.1	7/8	1.51
<i>Myotis brandtii</i>	6.5	3/8	0.87
<i>Pipistrellus abramus</i>	6.5	2/8	3.41
<i>Murina huttoni</i>	6.7	1/8	0.01
<i>Rhinolophus hipposideros</i>	6.9	4/8	1.07
<i>Pipistrellus</i> sp.	6.9	5/8	1.57
<i>Murina hilgendorfi</i>	7.0	1/8	0.02
<i>Pipistrellus kuhlii</i>	7.3	4/8	11.85
<i>Hypsugo savii</i>	7.5	3/8	0.10
<i>Asellia tridens</i>	8.0	3/8	0.27
<i>Myotis nattereri</i>	8.3	6/8	3.18
<i>Myotis emarginatus</i>	8.7	3/8	0.52
<i>Myotis capaccinii</i>	8.8	2/8	0.19
<i>Plecotus auritus</i>	9.3	6/8	3.19
<i>Myotis petax</i>	9.5	1/8	0.01
<i>Myotis annectans</i>	9.7	1/8	0.01
<i>Barbastella barbastellus</i>	9.7	3/8	2.46
<i>Plecotus</i> sp.	9.8	3/8	0.25
<i>Rhinopoma microphyllum</i>	10.0	2/8	0.05
<i>Pipistrellus nathusii</i>	10.2	4/8	0.82
<i>Myotis bechsteinii</i>	10.2	4/8	0.87
<i>Plecotus austriacus</i>	10.3	3/8	1.52
<i>Myotis daubentonii</i>	10.9	5/8	1.17
<i>Nycteris thebaica</i>	11.5	1/8	0.02
<i>Eptesicus nilssoni</i>	11.6	6/8	0.48
<i>Miniopterus schreibersii</i>	11.9	4/8	0.50
<i>Myotis</i> sp.	12.1	5/8	1.40
<i>Rhinolophus blasii</i>	12.5	1/8	0.02
<i>Rhinolophus eyryale</i>	12.9	3/8	0.27
<i>Myotis dasycneme</i>	13.2	2/8	0.25

Bat species	Weight of the bat species in g	No of owl species as predators	Percentage of the Total
<i>Rhinolophus</i> sp.	14.6	2/8	0.02
<i>Rhinolophus bocharius</i>	15.1	1/8	0.03
<i>Nyctalus leisleri</i>	16.0	2/8	0.16
<i>Vespertilio murinus</i>	16.6	5/8	9.82
<i>Vespertilio</i> sp.	16.8	1/8	0.01
<i>Vespertilio sinensis</i>	17.0	1/8	0.06
<i>Rhinolophus mehelyi</i>	17.6	1/8	0.01
<i>Eptesicus</i> sp.	18.5	1/8	0.01
<i>Hesperoptenus</i> sp.	18.8	1/8	0.01
<i>Otonycteris hemprichii</i>	19.0	3/8	0.40
<i>Eptesicus bottae</i>	20.5	3/8	0.17
<i>Myotis blythii</i>	21.3	5/8	1.64
<i>Eptesicus serotinus</i>	23.4	5/8	7.31
<i>Rhinolophus ferrumequinum</i>	23.5	3/8	0.93
<i>Taphozous nudiventris</i>	28.0	4/8	0.23
<i>Nyctalus</i> sp.	28.1	1/8	0.01
<i>Nyctalus noctula</i>	28.3	5/8	9.12
<i>Myotis myotis</i>	32.8	6/8	15.24
<i>Tadarida teniotis</i>	38.0	3/8	0.07
<i>Nyctalus lasiopterus</i>	40.1	2/8	0.02
<i>Cynopterus sphinx</i>	46.0	1/8	0.01
<i>Scotophilus heathi</i>	50.0	1/8	0.01
<i>Rousettus leschenaulti</i>	60.0	1/8	0.01
<i>Rousettus aegyptiacus</i>	135.0	2/8	0.49
Total number of bats eaten			19,864

Table 1. Occurrence of the bat species in increasing order of weight in the diet of eight most studied owls in Eurasia [1]. Bat weights from [2–10], as an average of values given. Sp. weight is the average of the species of that family. Owl diets included: *Aegolius funereus*, *Athene noctua*, *Asio otus*, *Tyto alba*, *Asio flammeus*, *Strix aluco*, *Strix uralensis* and *Bubo bubo*.

3. Bat prey species

Most commonly owls are taking *Pipistrellus pipistrellus* (16.0%), *Myotis myotis* (15.2%), *Pipistrellus kuhlii* (11.9%), *Vespertilio murinus* (9.8%), *Nyctalus noctula* (9.1%), and *Eptesicus serotinus* (7.3%), that is, six most eaten species make 70% of the material. All these mostly eaten



Figure 1. Eagle Owl has brought to its nest a *Rousettus aegyptiacus* ♀ with a sucking baby still alive when photo was taken in 2008. Courtesy of Ezra Hadad/prof. Motti Charter, Haifa, Israel.

bats weigh less than 33 g (**Table 1**). Rest of the numerous species represents less than 5% of each of this material, and bats heavier than 33 g represent only 0.6% of this material. None of the bat species are eaten by all eight European owl species but *Myotis mystacinus* is in the diet of seven out of eight owls, when *P. pipistrellus*, *M. myotis*, *M. nattereri*, *Eptesicus nilssoni* and *Plecotus auratus* are the prey of six owl species (**Table 1**). The heaviest bat species eaten by two owl species is 135 g weighing *Rousettus aegyptiacus* which is illustrated in **Figure 1** as a prey of the Eagle Owl.

4. Owl predation

Bats are captured by owls probably mainly during the periods of emergence or return from roosts, but owls are in general not well adapted for catching bats. An interesting calculation from the UK shows that the predation of birds (mainly owls) would account for about 11% of the annual mortality of bats despite the apparent low representation of bats in the diets of predatory birds [11]. Owls are regulated by the availability of their food, more bats there are in the territory more they can harvest, explaining why the bat predation is higher in the south. In Britain, bats comprised only 0.03% of prey taken by Barn Owl while in Morocco the percentage is 0.05% [11].

5. Bats can defend themselves

That bats could be dangerous if consumed whole is borne out by the report of the death of an Oriental Bay Owl *Phodilus badius* picked up dead disclosing the cause to be the wing bone of the bat protruding through the stomach [12]. In Poland, on its turn, a western barbastelle bat *Barbastella barbastellus* has been observed to attack an owl [13]. And in the same country, there is

an interesting observation on a Tawny Owl trying to catch *Nyctalus noctula* in the air but the bat “hid in the predator’s shadow” by flying very close behind it and waiting until the owl gave up hunting. Finally, the bat flew away safely after the owl ceased searching for the lost prey [14].

6. Conclusion

It is safe to conclude that owls prey on bats rarely and opportunistically, but also that bat aggregations could be a locally important food source for some species and individual owls during certain periods. Also, the decrease in the main prey (rodent) abundance can lead owls to expand their diet and include bats.

Further work is needed to evaluate the possible effects of owl predation on bat populations, and to determine the ecological and environmental dynamics between owl species and their main prey species. Owl predation on bats deserves future research also because on one hand, it might contribute to our limited knowledge on bats biodiversity and distribution, while on the other hand, it can sometimes represent an additional risk for small populations of endangered bats.

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